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DECIDUOUS-FRUIT INSECTS

L. F. Steiner, in charge of bait-trap investigations of the oriental fruit moth at Cornelia, Ga., submits some interesting paragraphs, which might well be quoted, giving results of moth trapping, both as to actual captures and as to reduction in both twig injury and infested fruit. His summary of the records of injury to fruit may be quoted as giving a general indication of results. He says: "The number of oriental fruit moth larvae per tree which attacked the fruit averaged approximately 7.3 for the baited orchards and 24.6 per tree for those not baited. The latter is a worm population in fruit per tree of four times that of 1930." In relation to this apparent benefit he points out that "Three important factors are tending to balance the infestation in the two areas (trapped and untrapped) and are hence lessening the apparent efficiency of the bait traps. The growers owning both baited and unbaited orchards are concentrating their clean-up work on the latter. All releases of Macrocentrus ancyliivorus (not a native parasite) have been made in or near unbaited check orchards. Larvae collected from several orchards since June 1 have averaged as high as 37 per cent parasitized. Migration into the baited area from unbaited orchards is lowering egg deposition outside and increasing it to a lessor extent inside."

"Positive proof of extensive movement or migration among oriental fruit moths at the present time," Mr. Steiner says, "is to be had in the recovery of a second adult (a female containing 133 eggs) which traveled over one mile of unbaited territory to the edge of the experimental bait area. Also in the recovery of a marked adult in a record trap on the opposite side of the large baited area, the release having been made at the east corner and the moth being caught at the south corner after traveling over five-eighths of a mile of solidly baited trees in less than two days. Only the record traps * * * were being examined. In the 37-acre experimental area several recoveries were made within two days on the outer edges of the block, some as much as 1,000 feet from the point of release."

Reporting on investigations of foreign parasites of the oriental fruit moth, H. W. Allen, Moorestown, N. J., says: "During this period (July-August) more than 122,000 parasite-containing hosts and nearly 2,000 parasites and parasite colonies were shipped (from France and Italy), each individual of which has been examined to exclude undesirable living insects. These shipments have included seven parasite species, two of which are new." The shipments were made by G. J. Haeussler.

H. W. Allen and J. K. Holloway report further progress with the rearing and distribution of Ascogaster quadridentatus Wesm. from one of these importations: "Emergence increased from 3,984 in July to 32,900 in August. The breeding has now been reduced, 54,500 additional eggs being inoculated during August. As anticipated, it has proved relatively easy to breed this species in large numbers, and, if required, almost unlimited numbers could be produced." *** "The success in rearing this European introduction has permitted the liberation of 58 colonies in southern New Jersey totalling 28,160. These were liberated in lots of approximately 500 each, and only in peach varieties ripening with Elberta or later." *** "By using an adapted vacuum collector and special cloth-capped vials, it has been found easy to assemble large numbers of parasites in such a manner as to permit a uniform diffused liberation over releasement area. The unit releasement of 500 is assembled in 25 tubes of 20 adults each. These are released one tube at every alternate tree in alternate rows, thereby obtaining uniform distribution for each liberation over a block of approximately one acre."

In connection with investigations of the codling moth (Carpocapsa pomonella L.) at Wichita, Kans., during the month of August, Paul M. Gilmer says: "Work on temperature and development was carried further with special reference to humidity relationships. From data at hand there is strong evidence that humidity acts as an agency tempering the effect of temperature. At high temperatures high humidity will produce normal hatch, while humidities much below 90 per cent cause drying and death of eggs."

A report on studies of the blueberry maggot (Rhagoletis pomonella Walsh) is submitted by L. C. McAlister, jr., Cherryfield, Me., who says that "emergence under natural field conditions was about 10 days later than the emergence from cages." The outstanding results of control experiments are summarized as follows: "Three applications of calcium arsenate at the rate of 6 pounds per acre reduced the maggot infestation in the berries at picking time 97.5 per cent; two applications of calcium arsenate at the rate of 6 pounds per acre applied on adjoining land under almost identical conditions reduced the maggot infestation 92.0 per cent; and two applications of a mixture consisting of 25 per cent calcium arsenate and 75 per cent lime, 6 pounds per acre, reduced the maggot infestation 83.2 per cent. The results from the use of calcium arsenate are about the same as those obtained in previous years. The results obtained by the growers have been satisfactory in most cases."

During the month of August a study of the larval parasites of the pecan nut case bearer (Acrobasis caryae Grote) occupied the major portion of the time of C. B. Nickels and W. C. Pierce, Brownwood, Tex. Mr. Nickels reports that he "devised a method that will probably be satisfactory for rearing the parasite Calliephialtes grapholithae Cress. in large numbers. Two females, which mated under artificial conditions, deposited a total of 46 eggs on nut case bearer larvae confined in small wire-covered racks and one of those adults is still active. It is probable that we will be able to breed this parasite every month in the year."

T. L. Bissell, Experiment, Ga., made studies in August to determine the height at which pecan nuts are injured by weevils, as affected by jarring of the trees. Results confirmed the 1930 records that most weevil work is in the lower portions of the trees.

The following points have been taken from Oliver I. Snapp's final report on the peach spraying and dusting experiments against the plum curculio at Fort Valley, Ga.: The curculio infestation was extremely light. The final notes on foliage and budwood injury caused by the insecticides tested were made on August 11. Practically no injury was caused by the fluorine compounds tested. Barium fluosilicate and cryolite, used as strong as 2 pounds in 50 gallons of water, caused no injury, although potassium fluosilicate caused slight traces of burning. Lead arsenate caused about the normal degree of injury. A 10 per cent lead arsenate dust caused moderate to light injury to the leaves. Four applications of lead arsenate spray at the rate of 1 pound in 50 gallons of water caused moderately heavy foliage injury, considerable defoliation, and occasional budwood injury. Four applications of the same material used with the zinc sulphate-lime spray, however, caused only light to moderate foliage injury and very little defoliation.

Mr. Snapp also reports results of experiments to determine the depth to bury peach drops to prevent the escape of C. nenuphar adults. "On May 12 one-half bushel of peach drops heavily infested with C. nenuphar larvae was placed in each of six boxes especially constructed for this work. Each box was without bottom and sunk 6 inches in the soil, so that maturing larvae would have facilities for pupating. Box No. 1 was left as a check with no soil on top."

Box No.	Number of inches of soil on top of drops	Total number of <u>C. nenuphar</u> adults that emerged from drops
1	Check (no soil on top)	93
2	18	16
3	21	15
4	24	5
5	30	13
6	36	29

Field spray tests in late July against the obscure scale (Chrysomphalus obscurus Comst.) at Shreveport, La., are reported by Howard Baker as follows: "In general, the per cent control increased (1) with an increase in the viscosity of the oil, and (2) with an increase in the strength of the oil applied. None of the tests gave a satisfactory control although a 2 per cent lubricating oil emulsion gave a good control of that portion of the scale population which did not settle beneath the parent or other old scale covering."

H. G. Butler, of the Harriman, Tenn., laboratory, reports the following results from tests in peach orchards against the plum curculio:

Plat	Treatment	Per cent curculio infestation
1	Barium fluosilicate 1-50 (with sulphur 8 lbs., talc 4 lbs.)	10.3
2	Cryolite 1-50 (with sulphur 8 lbs., talc 4 lbs.)	6.9
3	Potassium fluosilicate 1-50	22.8
4	Lead arsenate 1-50 (with sulphur 8 lbs., hydrated lime 4 lbs., calcium caseinate 1/2 lb.)	12.1
5	Check (sprayed with sulphur fungicide)	27.3
6	Check (no spray)	27.8

"No foliage injury of any importance was noted."

The following notes on work conducted at the grape insect laboratory at Sandusky, Ohio, under the direction of G. A. Runner are based on Mr. Runner's monthly reports and particularly on a recent field inspection of the situation by B. A. Porter:

The grape industry in northern Ohio is facing an extremely difficult situation, because of grape berry moth, spray residue, and low prices. It has been definitely demonstrated that the control of severe infestations of the grape berry moth by spraying is certain to result in excessive spray residue. The standard recommendations call for two sprays of lead arsenate, although in many vineyards the growers have found three applications necessary for satisfactory control. In severe infestations the control of the berry moth with shortened spray programs has been very unsatisfactory.

Mr. Runner has conducted a large number of tests of possible substitutes for lead arsenate, including the fluosilicates of potassium, sodium, and barium, and the fluoaluminates of sodium and potassium. All of these, although showing promise in the laboratory, have failed in controlling the berry moth in the field, and in addition have caused severe injury. Failures to control have also characterized the use of rotenone, of oil sprays, and of oil in combination with nicotine.

The most encouraging thing in sight at the present time is the utilization of cultural methods for the purpose of reducing the infestation to the point where one thorough early application of lead arsenate (which does not result in excessive residue) will give satisfactory control.

As indicated in last month's News Letter, a light covering of earth over the cocoons will prevent the emergence of moths. This has been pointed out several times by earlier investigators, but little use has been made of this in a practical way, and the cultural methods followed by most of the growers have tended to favor the berry moth instead of reducing its numbers. Mr. Runner has taken several vineyards which were previously heavily infested and changed the cultural practices so that the cocoons were buried during the emergence period of the moths, with the result of securing a very satisfactory degree of control with only one or at most two very early applications of poison. Near-by vineyards under normal cultural treatment have been much more severely infested. The method will be given further and more elaborate demonstration.

JAPANESE BEETLE AND ASIATIC BEETLE RESEARCH

Reporting on the life history and habits of the Japanese beetle (Popillia japonica Newm.), I. M. Hawley, Moorestown, N. J., says that "adult beetles decreased quite rapidly shortly after the beginning of August, and * * * during the same month they very largely deserted the various forms of trees, vines, and shrubbery upon which they feed during the height of the season and become largely limited to smartweed (Polygonum) on which they continued to be found in fair numbers as late as the end of the month. Daily examinations of the soil for stages of the Japanese beetle in a set of eight stations * * * showed eggs quite scarce after August 15" and second-instar larvae predominating over the other stages.

"The approximate percentage of the stages" of the Asiatic beetle (Anomala orientalis Waterh.) "to be found in the field at the end of the month (August)," according to Mr. Hawley, "is as follows: eggs 5 per cent, first-instar grubs 17 per cent, second-instar grubs 72 per cent, and third-instar grubs 6 per cent. The range of abundance of the grubs in field varies from 0 to 83 grubs per square foot."

On the life history of the Asiatic garden beetle (Aserica castanea Arrow), Mr. Hawley says: "eggs 14 per cent, first-instar grubs 53 per cent, second-instar grubs 17 per cent, third-instar grubs 1 per cent, and adults 15 per cent. The range of the abundance of the grubs in the field varied from 0 to 117 per square foot. * * * The following plants have shown 50 per cent or more defoliation: Asters, barberry hedge (young foliage), beggar-ticks, butterfly bush, Carolina poplar, carrot, chrysanthemum, cherry, dahlia, delphinium, English ivy (young twigs), goldenrod, pear, phlox, tree-of-heaven, and viburnum. Asters showed heavy defoliation more often than any other plant."

Among many interesting notes on insecticidal investigations, W. E. Fleming, Moorestown, N. J., reports that dusting against the Japanese beetle with lime and with a 5 per cent cresol dust apparently gave almost complete protection to sweet corn. In other words, on a property which sustained a loss last year of from 23 to 59 per cent, this year under machine dusting the loss will not exceed 2 per cent.

Mr. Fleming submits a record of the growth of various ornamental perennials in soils treated with lead arsenate at the rate of 1,500 pounds per acre. The great majority of these plants (list given) were apparently uninjured by the treatment. Others, however, were seriously injured or killed.

Experiments in trapping the Asiatic garden beetle (Aserica castanea Arrow) have been continued. Mr. Fleming reports: "The largest number of beetles caught in one night in the funnel trap was 8,361. In order to compare the relative effectiveness of the funnel trap with the baffle trap, the beetles resting on the objects in the lighted areas were collected. It was found that 25 per cent of the beetles in the vicinity were caught by the baffle trap while 75 per cent of the beetles were caught by the funnel trap. * * * The relative attractiveness (of color in connection with light) was as follows: white 47 per cent, yellow 16 per cent, aluminum 15 per cent, green 11 per cent, and red 8 per cent. * * * The most outstanding features (resulting from the trapping experiments) are that placing the bait in the baffle increases the efficiency of the trap 100 per cent over that of the 'standard' trap. A like result was obtained with green traps with white funnels and baffles. The traps painted pea green or light green are considerably more effective than traps painted olive green or dark green. The data have not been summarized with the series of traps involving the use of traps painted green and white together with parts of nickel."

Mr. Fleming also reports: "The experiments to determine a chemical for preventing oviposition of the Japanese beetle in grasslands or in fallow lands were continued during August." Of the various substances tested, "alpha-naphthol was the only material which tended to prevent oviposition. This chemical did not prevent oviposition entirely and proved very destructive to the grass."

Reporting on parasite work, J. L. King, of the Moorestown, N. J., laboratory, says that the colonies of Tiphia popilliavora Rohwer, which in 1930 underwent such a reduction in numbers that colonization had to be discontinued for the year, have increased again but "are far from being as populous as in 1929. However, in spite of this setback 4,300 females were taken which were sufficient for the starting of 43 new colony centers. * * * The first adults of this species were collected on August 4, one day earlier than in previous years. * * * In spite of the fact that large liberations of T. popilliavora have been made during previous years on Long Island, no recoveries have been made of this species either at Flushing or Jericho."

Mr. King also reports: "The presence of a new tachinid species, which was first recorded last year in the vicinities of Toyono, Tsuruoka, and Sunakoshi, Japan, was again verified. Puparia of this fly were found in material collected from two different localities on Kyushu, though in very limited numbers. Scouting still continues in the hope of finding areas where this new tachinid species may be more abundant than the species especially sought."

The second-generation flies of Dexia ventralis Ald., which started to emerge from the experimental plots at Haddonfield, N. J., July 22, continued to emerge until August 19. From these three plots a total of 68 females and 71 males, or 30.9 per cent, emerged. The females were used in propagation work. Mr. King states: "Approximately 2,400 parasitized grubs were secured and set out in cages at Haddonfield for biological studies." Diggings made at Haddonfield during the first half of August yielded an abundance of first-instar larvae, but only a few of the second instar and none of the third. Second-generation Dexia adults were common at Haddonfield until August 10, but disappeared completely by August 19. No adults were found at Andorra or Huntingdon Valley.

"The scouting for recovery of Prosenia siberita Fab. this month," according to Mr. King, "gives every indication that this species is rapidly on the decline in the Moorestown area as no adults were taken; nor have any recoveries been made at any other colony centers. A few adults were reared in the insectary on larvae of Serica.

R. W. Burrell, in charge of the collection in Australia of parasites of scarabaeid beetles and of the oriental fruit moth, is to be transferred at the end of this season to Japan to take up intensive studies there of native or other parasites of the fruit moth. Mr. Burrell has already submitted two detailed reports on his Australian studies and collections of parasites of scarabaeids.

TROPICAL, SUBTROPICAL, AND ORNAMENTAL PLANT INSECTS

Results of investigations at the Panama, Canal Zone, laboratory on the time of emergence of adults of various fruit flies are reported by James Zetek as follows: "There is a very definite period for emergence of adults which applies to all species studied. Very rarely do adults begin to emerge before 7 a. m. and practically all that will emerge during the day do so in the forenoon only, always on a rising temperature. * * * Field experiments were also made to determine the time of emergence and the data parallel those in the laboratory, the only difference being in the percentage that reach maturity." The species involved were the Central American fruit fly (Anastrepha striata Schin.), the West Indian fruit fly (A. fraterculus Wied.), the dark fruit fly (A. serpentina Wied.) and the papaya fruit fly (Toxotrypana curvicauda Gerst.). According to Mr. Zetek, A. fraterculus oviposits very readily in mango but the mango must still be green and within about 15 days of maturity.

In regard to termite control, Mr. Zetek states: "It is very gratifying to note that the Panama Canal (Administration) has followed up the recommendations * * * and that the present method of building construction affords almost perfect protection against these pests, and this without any significant increase in cost."

The distribution of Eretmocerus serius Silv., the parasite of the citrus black fly recently introduced into Cuba, has been carried on extensively during the past month. It is now well distributed throughout the island and commercial control has been effected on the groves which received the earlier liberations. A number of colonies have also been forwarded to the Canal Zone and to Haiti. The coccinellid beetle Cryptognatha sp., also introduced from Malaya, is occasionally fully as effective as the parasite, though in most of the groves it fails to increase sufficiently to have any appreciable effect upon the black fly population.

C. C. Plummer, Cuernavaca, Morelos, Mex., who is conducting preliminary experiments on the hydrogen-ion concentration of soils in connection with his work on the Mexican fruit worms, reports: "August was a month particularly favorable for such studies, because of the numerous dried or rotten mangoes found lying on the ground or buried in pits. It is believed that if the pH of the soil does change during the year it is lower in August and September than it is during any other months of the year." Mr. Plummer submits data procured from 12 soil samples taken from different places, with the following conclusions: "It is interesting to note the slight variability in the hydrogen-ion concentration of the soil taken from different places. These samples were all taken from the most diverse situations the writer was able to find in this garden."

In order to determine the effect of the heat from the sun in destroying larvae of the Mediterranean fruit fly, A. C. Mason, Honolulu, T. H., placed four collections of infested fruit in direct sunlight. He reports: "The temperature on the inside of the fruits registered from 100° to 110° for several hours each day. Seventy-two mangoes produced an average of 0.2 pupa per fruit after being in the sun ten days, while the check lot kept in the insectary produced an average of 2.3 pupae per fruit. Similarly treated star apples produced an average of 1.2 pupae per fruit, and the check lot 1.8; treated kamani nuts yielded 2.57 pupae, and untreated 5.88 pupae; treated rose apples gave 3.5 pupae, and untreated 13 pupae per fruit. Normally the fallen fruits are not usually exposed to direct sunlight for long periods at a time. These experiments show that a high percentage of the larvae are killed when this happens."

Continuing experiments in vapor-sterilization of fruits at the Honolulu laboratory, O. C. McBride reports: "Four lots of avocados of the variety Wishards were treated in the high-temperature room. Injury to the fruit is noted after three hours of heating. Firm fruit picked from the tree appears to withstand the heat treatment much better than ripe fruit. The variety Wishards has a good (Mediterranean fruit fly) infestation. We have secured 100 per cent control of the fruit fly larvae at temperature 110° F. for eight hours. Apparently larvae are killed more readily in avocados than in citrus fruits. Avocados subjected to freezing temperatures break down quickly on removal to room temperatures."

E. A. McGregor reports that an unusual type of attack by citrus thrips has developed at Lindsay, Calif. He says: "A marked lack of foliar development has caused the thrips to turn their attention chiefly to the fruits--in spite of the fact that the oranges were rapidly sizing and toughening. This condition has resulted in more than a normal amount of the superficial or 'silvering' type of injury to the rind. As a consequence, we have had to revise our opinions regarding the duration of time that the citrus fruits are susceptible to damage by the thrips."

Reporting on control of the soft brown scale (Coccus hesperidum L.), Mr. McGregor says: "Developments during the past two months have tended to refute the idea that the generous use of sulphur interfered with the work of scale parasites. There has been very general dusting during 1931, but in spite of this the soft brown scale has been nearly wiped out. A high percentage of the scales large enough to support parasites exhibit the exit holes. This objection to sulphuring has evidently been disposed of."

C. F. Doucette, Sumner, Wash., reporting on vapor treatments with commercial stocks of bulbs, says: "To September 1 the amounts treated are as follows: Laboratory equipment: 162 tons narcissus bulbs, 40 varieties; Van Zonneveld equipment: 278 tons narcissus bulbs, 25 varieties. Treatment will continue through September. Bulbs treated at temperatures up to 115° F. for 4-hour periods on August 29 and 30 show no external signs of injury September 1. Bulbs treated at periods of 4-6-8-10-12 hours at 111° on August 17 show no external signs of injury on September 1."

H. H. Richardson, reporting on experiments with pyrethrum and other insecticides at Washington, D. C., for the month of August says: "The combination sprays consisting of alcohol extracts of pyrethrum with dilute soap solutions were found to be ineffective for the control of greenhouse mealybugs (Pseudococcus citri Risso). Only the very immature insects were killed by these sprays, even when strong concentrations of pyrethrins (0.0270) were used. Emulsions of highly refined petroleum oils were found to be much more effective for mealybug control. The pyrethrin-soap sprays were very toxic to sowbugs (class Crustacea) when used at strong concentrations."

TRUCK-CROP INSECTS

Reporting on studies of soil insects at Walla Walla, Wash., M. C. Lane says: "There has been only a trace of rainfall at the laboratory during August and the temperature has been slightly above normal for this vicinity. The wireworms have been kept fairly deep in the soil and have not done any damage to crops, except potatoes. Damage to potatoes is largely done at this time by puncturing the new tubers and ruining them for marketing. The shade furnished by the potato vines, together with the irrigation water applied regularly, keeps a condition of soil around the tubers that is very favorable for the wireworms to work."

Experiments conducted by C. E. Woodworth, Walla Walla, with sulphur as a rearing medium for wireworms are reported as follows: "Preliminary experiments showed that large wireworms could survive in vials of undiluted sulphur to which water and food had been added. Recent experiments involving 1,000 young wireworms showed that the sulphur is almost as good as soil for the development of these larvae. * * * This series of experiments also indicates rather clearly that ground sulphur is not a good insecticide for the destruction of wireworms in the soil."

Mr. Woodworth has found in studies of mortality of wireworms "a very noticeable slowing in the death rate between the second and third months of life. For example, in the 20° C. cabinet there were placed 250 month-old first-instar larvae. At the end of a month 80 per cent of these were killed or had died. At the end of the second month only 20 per cent of the remainder, or 5 per cent of the original number, had met a similar fate. Field observations tend to support the view that there is an early high mortality with a subsequent high survival after a few months."

Reporting on the life history and habits of the sand wireworm (Horistonotus uhleri Horn), P. K. Harrison, Fairfax, S. C., says: "No females of this species were to be found during the month of August. Males were very scarce. At the beginning of August there were approximately 245 larvae in individual cages. At the end of the period there were 78. The stages of the larvae in breeding cages at the end of August were approximately as follows:

First instar -- 10.3 per cent
Second instar -- 55.1 per cent
Third instar -- 30.7 per cent
Fourth instar -- 3.9 per cent"

In his work on the external morphology of the beet leafhopper, J. C. Chamberlin, Twin Falls, Idaho, reports: "One interesting development along this line has been the discovery of a well-developed wing-coupling apparatus which apparently occurs in most, if not all, leafhoppers (Cicadellidae). So far as can be ascertained this structure is undescribed in entomological literature--at least in the more general sources."

The population of beet leafhoppers on various hosts in the vicinity of State College, N. Mex., for the month of August is reported by V. E. Romney as follows: "Lepidium alysscides has maintained a fair population of beet leafhoppers during August, in spite of the fact that both Trianthema portulacastrum and Acanthochiton wrighti appeared in the same environments. The latter two host plants support several times more leafhoppers than the mustard, but the mustard will draw the entire population by the latter part of September."

Host-plant preferences of the beet leafhopper at Riverside, Calif., are reported by H. E. Wallace to be Salsola pestifer, Atriplex semibaccata, and beets. "The greatest numbers are found on A. semibaccata and, since all the Riverside collections were from this host, the average of 57.9 for this district is considerably higher than for the other districts."

"The distribution of the overwintered beetles" of the Mexican bean beetle (Epilachna corrupta Muls.) "in the Estancia (N. Mex.) Valley," according to J. R. Douglass, "was fairly general over the bean beetle area of the valley that comprises an area of about 300 square miles. * * * Very few beetles occur on the mesa south of Mountainair, or in the northern part of the valley. These two bean areas are practically free of the beetles and are of no economic importance." As to damage, Mr. Douglass reports: "The hot dry weather checked the infestation in the valley so the injury to commercial plantings is confined to the western foothills. This insect has practically defoliated all the bean plantings west of the Punta, Manzano, Torreon, Tajique, and Chilili Highway. In addition, the insect followed the canyons down below the highway and defoliated plantings along the western edge of the valley. The above area covers about five thousand acres and the reduction in yield is conservatively placed at 50 per cent of the crop."

FOREST INSECTS

S. F. Potts, Melrose Highlands, Mass., reports as follows on results obtained with gipsy moth traps in which are placed substances containing those organs of the female gipsy moth which attract the males: "About 50 traps were put out in Saugus, Mass., making a total of about 150 for the season. These traps were spaced 100 to 200 feet apart along trails in an area of approximately 600 acres. A little over 6,655 male gipsy moths were caught in this area during the season, or about 10 miles per acre. * * * Tips from large females caught more males than tips from small females. Extract from freshly issued females caught a very small number of males as compared to extract from females one to four days old. Traps put out one month before the first males issued caught moths throughout the entire season. A double funnel or cone-shaped trap was devised with the idea of better trapping the males. It turns on an axis in such a way as to point the trap into the wind. About 90 per cent of the males caught came against the wind."

R. T. Webber, who is engaged in studies of parasites of the gipsy moth (Porthetria dispar L.) at Melrose Highlands, Mass., states that "males (of Tachina larvarum L.) issuing from puparia received from Europe have mated readily with T. mella (Wlk.) females issuing from puparia secured from native American hosts collected in the field, and puparia have been obtained from such mating. On the other hand no mating of male mella and female larvarum from the same sources has been obtained. From one to five puparia of larvarum were obtained from individual silkworms on which eggs had been placed by the female flies."

A. B. Proper, Melrose Highlands, Mass., reports that a second shipment of about 1,300 adults of Eupteromalus nidulans Thom. has been sent to the State of Washington for liberation in a satin moth infestation. As in the July shipment, "two lots were similarly prepared; one being sent by ordinary mail, and the other by air mail. Those sent by ordinary mail were about a day longer in transit than those sent by air mail and a larger percentage of mortality resulted."

The Monthly Letter for July referred to parasitism of the oriental moth (Cnidocampa flavescens Walk.) by the tachinid Chaetexorista javana E.&B. at points in Boston and vicinity, where the parasite was colonized in 1929 and 1930. The records are now complete and R. C. Brown reports that "the average percentage of parasitism for all points was 8.99, based on 1,904 collected cocoons. The percentages of parasitism for the different points ranged from 2.42 to 28.44."

J. E. R. Holbrook, Melrose Highlands, Mass., has completed a summary of experiments to determine the number of larvae and pupae of the gipsy moth that a single larva of Calosoma sycophanta L. would destroy during its existence. "This experiment was started on June 26 and ended July 27 * * * One beetle larva was confined in each of the trays, which were kept stocked with at least 10 specimens of P. dispar. As the specimens died or were eaten, replacements were made with living stock. * * * In 18 cases where the beetle larvae developed successfully to the succeeding stage, a total of 305 P. dispar individuals were eaten; the average being 16.94, or the figure 17 for practical purposes. The total of 305 P. dispar included 51 fifth-stage, 62 sixth-stage larvae, and 122 male and 70 female pupae * * * It appears that a more reliable method for obtaining feeding data would be from a system where weights of the larvae and pupae are considered, due to the lack of uniformity of specimens and the inability of determining, except superficially, the quantity of edible material which remains after the victim has been abandoned."

W. D. Bedard, Coeur d'Alene, Idaho, who has been studying the biology of the mountain pine beetle, states: "Sex studies of the mountain pine beetle show that in newly attacked trees the percentage of attacking beetles is 59.73 per cent of females and 40.27 per cent of males. In comparison with this figure, the brood as it emerges from the old trees, just prior to attack, was found to contain 50.4 per cent females to 49.6 per cent males."

F. P. Keen, Portland, Oreg., reports that in the Crater Lake National Park "fully 50 per cent of the lodgepole stands in areas where control work has been done (against the mountain pine beetle) have been saved through the work."

Observations on activities of the hemlock looper in southwestern Washington during the latter part of August are reported by Mr. Keen, as follows: "The dusting work (by airplane) thinned the number of loopers sufficiently to prevent complete defoliation of the trees on some 2,000 acres and hence saved a very considerable amount of timber from destruction this year. Feeding reached a peak about the 15th of August when the first pupae were observed. Since that time pupation has increased rapidly and feeding decreased. Maximum pupation occurred about the end of the month. A large area south of the Naselle River presented such insuperable difficulties for airplane dusting that much of it had to be abandoned altogether and other portions received an inadequate dosage.

* * * The area of forest killed through complete defoliation more than doubled in extent, while north of the river in the more heavily dusted areas very little spread took place."

Later developments in the parasitism of the pine tip moth (Rya-cionia frustrana Comst.) are reported by L. G. Baumhofer, Halsey, Nebr.: "A check of some 150 cocoons of Campoplex frustranae Cush., collected in July, indicates a small amount of secondary parasitism on this species which was introduced in 1925 for the control of the pine tip moth. A specimen of Eurytoma tylodermatis Ashm. and of Habrocytus emerged from these cocoons. Both species were present when the introduction took place and are themselves ordinarily primary parasites of the tip moth."

"Examinations, in late August, of young yellow pine in plantations not treated for grasshoppers give an idea of the amount of damage caused by these insects to the remaining trees," says Mr. Baumhofer. * * * "Out of 500 trees in a 1928 planting, 84 per cent showed evidence of grasshopper work; 8 per cent of all trees were completely girdled near the base, while an additional 20 per cent had growth seriously impaired or a possibility of dying. In a 1929 plantation, out of 500 trees examined, 68 per cent had been fed on by grasshoppers, 4 per cent completely girdled, and 12 per cent additional seriously injured. Many of the smaller trees in the latter plantation were hidden in the grass which probably afforded some protection." One application of poisoned bran mash resulted in a kill of 62 per cent.

Mr. Baumhofer also reports areas of discoloration in yellow pine seed beds in the nursery. "This was found to be due to loss of chlorophyll, caused by the feeding of a small mite. These mites were numerous in all stages and dozens of eggs were counted on a single pine needle. Soon after, this same type of injury became apparent over large areas of the transplant beds, only western yellow pine being affected. The mites were controlled with a 1 per cent white oil emulsion spray."

Early in August T. T. Terrell and four assistants began an insect survey in the Coeur d'Alene (Idaho) National Forest, for the purpose of securing data relative to the results of the 1931 bark beetle control operation and the need for additional control in 1932. Mr. Terrell reports: "Preliminary results of this survey would seem to indicate that in the drainage of the Little North Fork of the Coeur d'Alene River there has been a slight increase of approximately 50 per cent over the infestation of 1930. This condition can be explained by the fact that only a very small portion of this area was covered by control in 1930, and though the infestation is still exceedingly light there has been this increase over last year's infestation. In the Steamboat Creek drainage, where a rather thorough second cleanup was made this spring, there has been a substantial decrease in the infestation. This project will be completed early in October." This forest is the scene of the largest bark beetle control project ever conducted. In 1929, \$135,000 was spent in combating an outbreak of the mountain pine beetle in white pine, and in 1930, \$50,000 was spent in control work.

J. M. Miller, Berkeley, Calif., reports: "Life-history records (by G. R. Struble and assistants) indicate that the fir engraver (Scolytus ventralis Lec.) will complete a partial summer generation for 1931, as new adults have already emerged from logs attacked early in the summer. This rate of development has never been previously observed, and is probably due to the unusually high mean temperatures during July."

Reporting on a survey on August 16 of infestations of the southern pine beetle (Dendroctonus frontalis Zimm.) in the vicinities of Paint Branch, Tenn., and Hot Springs, N. C., R. A. St. George says: "As the result of attack in the former locality during the summer of 1930 many pitch shortleaf, and scrub pines were killed. Later in the fall the surrounding white pines were taken. In this region, as elsewhere, the woodpecker work (of last winter) was noted to have been very heavy and is believed to have been an important factor in the natural control of this beetle. Abnormal weather conditions also are believed to have been important in this respect."

"An interesting phenomenon was observed by R. A. St. George and R. C. Hall on the summit of Mt. Pisgah, N. C., on August 25," says Mr. Hall. "Lady bird beetles (unidentified) were congregating on the summits and had collected in great masses on laurel, blueberry, and rhododendron. Some of the masses of beetles were as large as a man's fist. They were observed to be mating and apparently were there for the purpose of hibernating."

CEREAL AND FORAGE INSECTS

A new method of shipping Phaeogenes nigridens Wesm., as devised by Herbert D. Smith of the Hyères, France, laboratory, resulted in a distinctly reduced rate of mortality. Details: The type of box used last year was enlarged to accommodate two 150 cubic centimeter bottles of sugar solution. A cotton wick was inserted, thus serving to keep moist the large cotton plug fastened over the mouth. Two thousand parasitized pupae were packed in small cloth-screened cardboard boxes that were tied to the partitions, which were then slid in place inside the box. A rack containing the bottles was nailed inside and the cover fastened down. Screened holes at either end allowed a circulation of air. As the parasites emerged they escaped from the small boxes through the cloth netting in the top of each. The filled boxes were kept at room temperature until embarkation. This permitted the parasites to develop normally and reach the adult stage before being placed in the refrigerator on board the ship. A total of 1,074 adults collected in the cage where the pupae were stored were placed in one box. The adults were blown or brushed lightly from the walls of the cage into a lamp chimney having a cardboard cone at one end, serving as a baffle plate. From the chimney they were blown through one of the holes into the box.

Mr. Smith has definitely established that Phaeogenes hibernates as an adult, living from August to June of the following year. About 400 workers were employed to collect the pupae. They were paid so much per pupa which netted for the best workers a daily wage equivalent to that established by the Fascisti Syndicate for farm labor. Ten girls were used in the temporary laboratory to separate out the parasitized pupae. About 105,000 pupae were collected. A total of 7,000 parasitized corn borer pupae and 1,074 adults of Phaeogenes were collected from July 31 to August 10 in the vicinity of Ghisalba (near Bergamo, Italy) and shipped to Arlington from Genoa on August 14. They were to arrive at Arlington via New York about August 25.

S. M. Dohanian, who is making a study of parasites of the European corn borer at Arlington, Mass., reports: "Phaeogenes sp. from Japan were received in a test shipment. Forty-two live adults were secured from 120 Pyrausta nubilalis pupae and 39 were liberated. Phaeogenes nigricens from Italy were also received. More than 5,000 adults have been secured and liberated from a shipment containing 1,074 adults and 7,300 P. nubilalis pupae. Paratheresia claripalpis V. d. Wulp, a dextiid parasitic on the sugarcane moth in Peru, produced 1,476 adults from the 5,000 puparia received. One thousand one hundred and sixty-three of these adults were liberated in Saugus, Mass., as a field test. The remainder were utilized in laboratory tests using P. nubilalis, a variety of host plants, and various native larvae with no success."

A considerable increase in parasitism in Saugus, Mass., by introduced species is reported by R. A. Biron, who says: "Bulk collections indicate better than 7,000 parasites per acre in corn compared to slightly over 1,000 as reported last year." Most of these were the fly Masicera senilis Rond., and the wasp Inareolata punctoria Roman.

At the Monroe, Mich., sublaboratory, W. A. Baker and E. W. Beck have completed laboratory studies conducted to determine which borer instars will support Masicera senilis larvae. The percentage of parasitism that may be obtained increases with each successive instar from the second to the fifth, and then there is a slight decrease. There is also a direct relation between the size of the borer (host) and the size of the puparium obtained, full fed and hibernating borers producing the largest (puparia).

C. A. Clark, Kobe, Japan, makes the following report on the introduction of parasites of the European corn borer: "Test shipments of 320 Cremastus hymeniae Vier. were made to the Arlington laboratory on July 4. These were sent in the cocoon stage with provision for emergence of adult parasites en route. A part of these were sent in cold storage to Seattle (Wash.) and received and forwarded from there through the cooperation of A. G. Webb of the Plant Quarantine and Control Administration. On July 31, a test shipment of 120 Phaeogenes sp. in the larval and prepupal stages was made via Seattle. Provision was made for emergence of adult parasites en route. On the same day a test shipment of 400 field-collected corn borer pupae containing this pupal parasite was made to Boston (Mass.), via the Suez Canal. Some specimens of corn borer parasites obtained from Formosa were sent to Arlington (Mass.) for determination."

J. C. Frankenfeld, Tempe, Ariz., who, earlier in the summer, collected eggs of the range caterpillar (Hemileuca oliviae Ckll.) for the purpose of making a count of the current percentage of parasitism, reports that "five series of tests have been completed on the effect of the stage of development of host eggs upon parasitism, all of which demonstrate conclusively that Anastatus semiflavivus Gahan will parasitize host eggs which contain fully developed larvae without impairing the vitality of the parasites." He also reports that "the period of incubation of the parasites at 85° F. is the same for all stages of host egg development. * * * Range caterpillar eggs frozen in a block of ice for 30 days maintained their viability and Anastatus semiflavivus females oviposited readily in such host eggs and the resulting parasites developed and emerged normally."

Reporting on studies of the clover seed chalcid at Tempe, Ariz., V. L. Wildermuth says: "Field sweepings have been continued at intervals throughout the month with a view of keeping a check on the relative percentage on different parasitic species as compared with the numbers of host insects and to determine the distribution of males and females of each. Binocular examinations, made by E. E. Russell, of 2,836 specimens taken from field sweepings show the parasites to have increased during August from 27.3 per cent, as reported in July, to 55.7 per cent for August. As previously reported, Trimeromicrus maculatus Gahan is the main early-season parasite, while Tetrastichus bruchophagi Gahan and Liodontomerus sp. increase later in the season." L. L. Stitt of this station makes the following report on overwintering larvae of Tetrastichus bruchophagi obtained from March to August: "501 overwintering larvae (Tetrastichus bruchophagi) were under observation, from which 288 adults emerged, 176 being females and 112 males. Two hundred and thirteen, or 42.51 per cent, died without transformation to adults. The average length of the pupa stage for the females was 11.75 days and for the males, 12.31 days."

E. G. Davis, reporting on control activities against the southwestern corn borer (Diatraea grandiosella Dyar) in the Tucson, Ariz., district, says, "it was found that 33 per cent barium fluosilicate dust was just as effective as stronger dusts up to and including 100 per cent barium fluosilicate. Infestation of cornstalks in the checks was about 70 per cent, which was reduced 50 per cent by the application of the dust. The egg parasites Trichogramma minutum Riley and Prospaltella sp. have very effectively controlled the corn borer this year. * * * The eggs of the partial third generation were 99 per cent parasitized and of this number 85 per cent was by Trichogramma minutum and 14 per cent by Prospaltella sp. Trichogramma minutum adults were very numerous on green corn during August. The larval parasite Apanteles diatraeae Mues. increased its percentage of parasitism from 4 per cent on the first generation to 19 per cent on the second generation. During the last half of August adult Apanteles diatraeae were numerous in green corn in search of young corn borer larvae. Due to the high percentage of parasitism of eggs by the egg parasites and the resulting scarcity of corn borer larvae, the effectiveness of this parasite was greatly curtailed."

R. A. Blanchard, Sacramento, Calif., states that of 643 larvae of the southwestern armyworm (Prodenia praefica Grote) "collected in the field between July 15 and August 4, 65.3 per cent * * * died from a polyhedral disease, 12.9 per cent from unknown or other causes, 12.3 per cent were parasitized by Hymenoptera, 4.6 per cent by Diptera, and 4.6 per cent produced adults. The hymenopteron Chelonus texanus Cress. and the dipteran Archytas californiae (analys Fab.) were the two most prevalent parasites in this lot of material."

"Reporting results obtained from a corn-variety test conducted at Devers, Tex.," says A. I. Balzer, Beaumont, Tex., "it seems that some varieties are better able to withstand borer damage than others. In the item of broken-over stalks resulting from borer damage, the varieties of Tuxpan and Sacaton June were the least damaged. Sacaton June was also the highest yielding variety, outyielding the lowest variety by 12.5 bushels per acre."

T. E. Holloway, New Orleans, La., reports: "We continued to receive and release parasites from Peru. The last shipment of the fly Paratheresia claripalpis V. d. Wulp has been received, but flies are still emerging and being released from puparia now on hand. H. A. Jaynes sent us a total of 444,017 puparia during the summer. The sending of such a large number of puparia was made possible by Mr. Jaynes's organization of native collectors. He deserves much credit for his industry and initiative. Shipments of the wasp Ipobracon rimac Wolcott are still arriving." Shipments in the new crate (described in the July Monthly Letter) have been so successful that as many as 84.4 per cent have been received alive.

Control experiments conducted by W. B. Noble against sod webworms at Columbus, Ohio, are reported by C. M. Packard, who says: "Kerosene emulsion, costing 1/6 cent per square yard for materials, and pyrethrum extracts, costing about 3 1/2 cents per square yard for materials, were found very effective and practical for use on lawns and golf greens. Lead arsenate dust used as recommended by J. S. Houser was fairly effective but slower in action, less efficient, and more trouble to apply."

Reporting on grasshopper investigations at Bozeman, Mont., J. R. Parker says: "Ecological studies of Camnula pellucida Scudd. were conducted on the area under annual observations at Lakeview, Mont., by H. M. Jennison and Fred Morton during the first half of August, and by Dr. Jennison and J. R. Parker from August 19 to August 25. These studies have already shown that various species of grasshoppers are rather closely restricted to certain plant associations and that a knowledge of the associations preferred by C. pellucida will be of great value in scouting and conducting surveys for this particular grasshopper."

COTTON INSECTS

Dusting experiments against the cotton leaf perforator (Bucculatrix thurberiella Busck) at the Calxico, Calif., sublaboratory are reported by T. C. Barber, who says: "During the month (August) a large series of small-scale dusting experiments were conducted, utilizing eight different insecticides. These eight insecticides included lead arsenate (which gave the best results in the last year's work and was used again as a key insecticide to check the results obtained from the new compounds); barium fluosilicate; sodium fluosilicate (Levosol) in two combinations, light and extra light; synthetic cryolite; and three sulphur combinations, ground, flowers of, and flotation, the latter combination containing 20 per cent of flotation sulphur in 80 per cent of ground sulphur. * * * the best results were again secured from lead arsenate, followed in turn by barium fluosilicate and flotation sulphur. The barium fluosilicate, however, gave indications of being the most lasting and persistent of the different insecticides, excelling even the lead arsenate in the longer-continued tests, although lead arsenate invariably led in the earlier examinations after dusting."

"During the month (August) evidence of a definite (leaf perforator) moth migration has been secured," writes Mr. Barber. "Following a very light infestation in the experimental field of cotton during July, soon after the beginning of August the moths on a number of occasions showed up in larger numbers than any other stage, which is decidedly unusual since under normal conditions the larvae outnumber both the pupae and moths. * * * These moths were too numerous to have developed from the light perforator infestation existing in the field before they appeared, and evidently they must have flown in from more heavily infested locations, probably from some of the cotton fields in Mexico some 15 or 20 miles to the south. Additional corroborative evidence was obtained by the collection of a number of moths near lights in the city of Calxico, several miles from the nearest growing cotton. Evidently the species is much stronger in flight than it has been given credit for."

G. L. Smith and assistants, who are making studies of field migration of the boll weevil (Anthonomus grandis Boh.) at Tallulah, La., report that "the movement of insects was much greater (during August) than in any previous month. Especially was the increase of boll weevils noticeable. No doubt more boll weevils were collected during August this year than in any other season since screen collections have been conducted." They also state: "Daily readings were made in the three series of screen studies located on the laboratory grounds. Tanglefoot was applied August 4, 18, and 31. As in the field studies, there was an increase in number of insects over previous months. During the latter part of the month weevils were taken from the top screen on the tower which is 57 feet above the ground."

Life-history studies with the tarnished plant bug (Lygus pratensis L.) are reported from Tallulah, La., by K. P. Ewing and assistants, who state: "Four nymphs were reared to maturity during August. The average number of days in the nymphal stage was 17. Egg incubation records were secured on 608 eggs during August. The average incubation period was 9.3 days, the maximum being 12 and the minimum 7. The host plants of these eggs were Erigeron annuus (L.) Pers. and E. canadensis (L.)" The same workers report: "Fourteen attempts were made to rear nymphs to maturity, cotton being used as the host plant. Two were successfully reared, the average life being 19.5 days. A total of 17 egg incubation records were secured during the month. The average incubation period was 12.8 days, the maximum being 14 and the minimum 12."

Emergence of the cotton flea hopper (Psallus seriatus Reut.) has been observed at Tallulah, La., by K. P. Ewing and assistants, who report: "A total of 142,908 cotton flea hopper nymphs emerged (from the cages) during 1931. This emergence occurred as follows: March, 1,989, or 1.39 per cent; April, 93,946, or 65.75 per cent; May, 45,703, or 31.98 per cent; June, 936, or 0.58 per cent; July, 433, or 0.30 per cent; August, 1, or 0.0007 per cent of total."

Mr. Ewing and assistants completed cage tests made during July and August with 5 hemipterous and 4 homopterous insects. Mr. Ewing says: "These tests were to determine whether or not each species of insect studied caused damage to cotton plants and to note the type, intensity, etc., of the damage, if any. * * * Excellent results were secured, showing that Lygus pratensis L. and Adelphocoris rapidus Say caused severe injury to bolls and large squares. Psallus seriatus Reut. caused injury primarily to small squares, with an occasional large square showing slight damage."

"Sweepings were made at weekly intervals" during August "on 15 weed host plants and cotton to determine the populations of Psallus seriatus Reut., Lygus pratensis L., and Adelphocoris rapidus Say on their respective host plants," reports Mr. Ewing. "A total of 1,200 sweeps was made on croton with an average of 1,052.7 P. seriatus per 100 sweeps. * * * A total of 1,100 sweeps was made on Chamaecrista robusta with an average of 126.9 A. rapidus per 100 sweeps. * * * This plant (C. robusta) is by far the most important weed host plant of this insect at this season of the year. * * * Sweepings on cotton during August revealed a still further decrease of mirids on cotton since July. The predominating mirid in cotton during August in the vicinity of Tallulah was A. rapidus; however, in certain localities L. pratensis was still numerous enough to cause considerable damage."

INSECTS AFFECTING MAN AND ANIMALS

Encouraging results have been obtained by W. E. Dove and D. G. Hall, Charleston, S. C., with treatments designed to kill sand-fly larvae. A waste product known as "sumpage water," obtained during the process of creosoting pine timber, and consisting of water and pine sap impregnated with creosote oil, "gave a complete kill in dilutions of 1 to 1,500," reports Mr. Dove. "It gave approximately a 90 per cent kill in dilutions of 1 to 2,500, but required two hours or more. * * * We found that one part of crude carbolic acid to 20 parts of sumpage water gave a complete kill in laboratory tests of 1 to 10,000. This product also gave us a kill on the larvae of Aedes aegypti L. in dilutions of 1 to 1,000,000. It was just as effective on larvae collected from the salt marshes and which we regarded as Aedes sollicitans Wlk. * * * In one instance the material was reached by a spring tide shortly after it was sprayed. This treatment gave us a kill which we estimate to be about 50 per cent. On the second test with this larvicide, our experiment was not interfered with by the rise of the spring tide. Repeated collections from the latter area show that the larvicide is 95 to 96 per cent effective in destruction of the larvae."

H. H. Stage, Portland, Oreg., reports that a "pyrethrum soap preparation was used to test its toxicity to mosquito larvae. A dilution of 1 to 10,000 killed (larvae) in 3 hours, 1 to 300,000 in 48 hours, and 1 to 500,000 in 72 hours. It was claimed that a concentration of 1 (part pyrethrum-soap) to 2,000,000 (parts) of water was toxic to mosquito larvae, but our tests showed that we could not get a 100 per cent kill at that dilution."

At Galesburg, Ill., where 50 head of horses were slaughtered and examined for bots (Gastrophilus spp.), while "not one stomach was entirely free of bots and many were heavily infested," G. intestinalis De G. predominating, no larvae were found in the pharynx and no lesions in the skin of the jaw and the underlying tissues, although, according to R. W. Wells, in charge of the work, "some of these hosts had moderate infestations of eggs(of G. nasalis L.) * * * on the hair of the jaw. The absence of any lesions supports our theory and supplements our evidence reported last month that the larvae of this species, upon hatching, migrate down the hair and skin to the mouth and make their entry through the mouth. We now believe that these larvae never penetrate the skin of the host, as has been considered one of the possible methods of ingress."

O. G. Babcock, reporting on control of goat lice at Sonora, Tex., says that, "as rotenone is proving to be an effective dip against goat lice, a 76-pound goat was fed 3.57 grams hourly until 17.85 grams was given, in capsules." No injurious effects were observed in the animal tested except that it "went off feed for a few days immediately following treatment." Mr. Babcock states that a ranch "flock of scrub goats had a heavy infestation of red lice. Three hundred and fifty-nine goats were dipped in 300 mesh sulphur 105 days ago. Each goat was held in the vat for three minutes, and the temperature of dip ranged from 100° to 105° F. Final examination showed the goats to be 100 per cent free of lice, animals in excellent condition, mohair clean, locks curly, no matting or tangles whatever, and no goats were observed scratching, biting, or horn-ing themselves." On another ranch a "flock of lousy goats, that were heavily infested with the blue or sucking louse, and the red or biting louse, were dipped in gas sulphur dust on June 16, 1930. On August 29, 1931, * * * these goats were found to be free of lice. After three successive shearings after dipping, with the exception of one billy which was in another pasture by itself, all the goats were free of lice. * * * This is a most remarkable record for the reason that this ranch is surrounded by infested goats on all sides." In an experiment at Menard, Tex., five ranchmen participated. Mr. Babcock says: "The total number of goats dipped with 300 mesh pure sulphur plus the soap was 2,449 head. Two months following dipping the goats were carefully examined during shearing * * * and not a single louse was found." In another experiment goats were dipped in a mineral oil-soap solution "at dilutions of 1 to 15, 1 to 30, and 1 to 45. It required a rather strong dip, 1 to 15, to kill all the lice. The dilutions of 1 to 30 and 1 to 45 killed just a few of the lice. Very little staining of the mohair was observed."

Studies on blowfly parasites and predators at Uvalde, Tex., are summarized by D. C. Parman as follows: "Predators were less generally distributed in New Mexico areas than in Arizona except in the mountain timbered area east of Albuquerque. Predators were present in 103 of the total of 117 jars collected in Arizona, and excluding the mountain forests only 8 of 39 jars exposed in New Mexico had predators. The larval parasite Xyalosema is indicated to be well distributed in Arizona. It is possible that parasites and predators exert a considerable control of blowflies in Arizona and may account for the screw worm being less of a pest in these areas than at other places. At present we have not been able to account for this by climatic or other ecological factors. This indicates that this may be a fruitful field for study."

Mr. Parman also reports on tabanids (Tabanus rubescens Bellardi): "Collections of tabanid eggs have been made to obtain percentage of parasitism in several localities. There have been from 35 to 85 per cent of the eggs collected from the Nueces and Frio Rivers parasitized during July and the first part of August. Eggs collected on San Saba River near Menard on August 15 had 80 per cent parasitized, and eggs collected on the Llano River on August 16 had about 25 per cent parasitized."

The continued effectiveness of control of the screw worm fly by trapping in the vicinity of Dallas and Menard, Tex., as noted last month, is reported by E. W. Laake, as follows: "The total catch of all species of blowflies taken in the trapped area from July 20 to August 20 amounted to 1,546 quarts. * * * One hundred and eighty new screw worm (Cochliomyia macellaria Fab.) cases were recorded in the trapped area as compared with six hundred and fifty-seven in the nontrapped area. No other monthly period this season has shown such a marked difference in favor of the trapped area."

STORED-PRODUCT INSECTS

The completion of one of the largest warehouse fumigations ever conducted in the United States is reported by W. D. Reed, Richmond, Va. The fumigation involved the use of 10,500 pounds of liquid hydrocyanic acid and a total warehouse space of nearly 7,000,000 cubic feet, and was directed against the tobacco moth (Ephestia elutella Hbn.) and the tobacco beetle (Lasioderma serricorne Fab.). It was arranged by two tobacco companies and the Bureau of Entomology, the officials of the companies agreeing to furnish labor and materials for sealing the warehouses, and to pay a professional fumigator to apply the liquid hydrocyanic acid, and the Bureau officials to supervise all the work and to receive full cooperation in testing the results. Mr. Reed says: "On August 1 we completed the fumigation * * * During the period August 1 to 15 Messrs. Morrill, Livingstone, and Green made examinations of the test lots of insects from the fumigated warehouses. The tobacco moth larvae showed a greater resistance to HCN than the tobacco beetle larvae in these experiments." A tabulation of percentages of kill shows that the mortality of larvae of the tobacco beetle was practically 100 per cent to a depth of 6 inches in the hogsheads, while at a depth of 3 inches the mortality of the tobacco moth larvae ranged from 20 to 100 per cent, and at 6 inches from 20 to 80 per cent. The dosage was 24 ounces HCN per 1,000 cubic feet, the period of exposure was 144 hours, the mean temperature 82° F., and the mean relative humidity 62.7 per cent.

The effect of paradichlorobenzene upon the viability of certain seeds is reported by George M. Ellington, Sligo, Md., who says: "Germination tests of certain varieties of seeds, which have been under constant fumigation for approximately eight months, show a decided injury to treated seeds, as compared to the untreated checks. Some of the varieties treated had failed to germinate when the last tests were made."

On August 11 A. O. Larson, Corvallis, Oreg., met with pea growers from Canby, Barlow, and Aurora and discussed pea weevil control. He reports: "As a result of the discussion all present voted to burn their pea fields and five committees were appointed to secure fire permits and burn the pea stubble in their respective sections. It was also voted to ask the Horticultural Commissioner to institute proceedings against the owners of a 100-acre field of peas which was not being harvested. The peas in this field were staked up and wired. Fifteen men were hired to pull and burn the peas. The pea stubbles were burned on August 14."

TOXICOLOGY AND PHYSIOLOGY OF INSECTS

M. C. Swingle, who has been making a study of synthetic media for codling moth larvae at Takoma Park, Md., reports: "The experiment of rearing codling moth larvae in an agar medium * * * has been terminated. Eight of the 50 larvae confined in the mixture of agar and juice of green apples completed their growth by the first week in August. All the rest died before becoming full grown. The eight larvae died before pupation, however, thus indicating that sufficient nutritive requirements are not present in the fleshy part of the apples to rear normal larvae. The experiment will be continued as soon as first-instar larvae are available."

D. E. Fink, Takoma Park, Md., reports: "A microsyringe made in this laboratory from thermometer tubing with one end ground to fit a No. 27 Luer slip needle and mounted on a board having a millimeter scale served as the means for accurately measuring or injecting minute amounts of fluid in insects. With this microsyringe it is possible to measure or inject 0.003 to 0.01 cubic centimeter (of fluid) with a variation of only 0.0003 cubic centimeter. * * * By means of this microsyringe definite quantities of radioactive lead arsenate were injected into the following species of insects: larvae of Bombyx mori (L.), adults and larvae of Leptinotarsa decemlineata (Say), larvae of Pieris rapae (L.) and Autographa brassicae (Riley), and full grown Melanoplus femur-rubrum (DeG.). The dosage given varied with the species and was from 0.01 to 0.03 cubic centimeter. After 24 hours the injected insects were killed and the tissues and organs that were dissected out are shown below (data submitted). Each part was charred or ashed and weighed and the radioactive material contained in the ash of each part as determined by means of an electroscope by C. Lukens was calculated to per gram weight and served to establish the relative distribution in an insect of a given dose of the radioactive lead arsenate."

TAXONOMY OF INSECTS

L. L. Buchanan has recently identified specimens of a European weevil (Sitona cylindricollis Fab.) received from R. F. Copples, Assistant Agriculturist, U. S. Morgan Horse Farm, Middlebury, Vt. According to Mr. Buchanan, "European literature indicates that this species is not of much economic importance in Europe although widely distributed there and known to attack one of the sweet clovers, Melilotus officinalis (L.) Lam."

BEE CULTURE

F. E. Todd and Geo. H. Vansell, Davis, Calif., accompanied by J. E. Eckert, of the University of California, made a trip in August to the mountain apiary at Strawberry in Eldorado County, where the colonies remaining from the buckeye experiment near Placerville had been placed for recovery. They report as to the brood rearing in the "buckeyed colonies," that "new queens, purchased from a commercial queen breeder, when introduced into these colonies, laid in worker cells, eggs which produced drones, just as did the original queens. Two of these original queens, when removed and brought to Davis, produced normal brood and are building up normal colonies, while those allowed to remain in their original colonies with bees which had passed through the buckeye flow continued to produce drones even after all their buckeye honey had been used and when they were feeding entirely on normal honey gathered at the new location. Only those colonies which had been given a four-frame nucleus, with queen, came back to normal condition. It appears that worker bees which have passed through the buckeye poisoning are no longer capable of assisting in producing worker bees." No explanation has been found as to why these queens lay worker eggs when in normal colonies, but when in buckeyed colonies only drones are produced from their eggs, even when laid in worker cells.

A. P. Sturtevant, Laramie, Wyo., reporting on inoculation of individual larvae with Bacillus larvae, says: "In the laboratory in an observation hive several series of larvae have been inoculated in a similar manner to the field experiments (with approximately known numbers of spores per each 0.01 cubic centimeter per larva) except that the spore suspensions have been killed in the sterilizer and the suspension has been slightly colored with water-soluble eosin in an effort to see what happens to this spore suspension in honey syrup. Apparently the nurse bees pay little attention to the cells to which the suspension is given for more than half an hour, at least sufficiently long for the larvae to have had time to ingest some of the suspension. Furthermore, it was found that if the larvae so inoculated were within 12 hours of being capped over, only occasionally were the larvae dragged out by the bees; but if younger larvae were inoculated a considerable number were likely to be removed from these cells. It is difficult to understand why a larva that is inoculated with such a large number of spores and is not removed, but sealed over, does not develop the disease. This seems to coincide with Toumanoff's observations that the artificial inoculation of bee larvae is quite difficult." W. C. Northrup assisted in this study.

Flight-range and production studies have been continued at Laramie by Mr. Sturtevant, Mr. Northrup, and Russell Smith. Mr. Sturtevant reports: "At Laramie we have had 20 colonies on which weight records have been kept. Ten colonies are within one-eighth of a mile or less of sweet clover, and up to the present have made a net gain in weight during the summer of 280 pounds. Another 10 colonies have been located on the campus and have had to fly from a mile and a quarter to a mile and a half to reach the sweet clover. These colonies have made a net gain of only 181 pounds."

Mr. Sturtevant also reports that on August 21 he attended the funeral of Frank G. Rauchfuss, "one of the outstanding commercial beekeepers of the Intermountain Region, whose loss will be felt keenly, particularly by the Colorado Honey Producers Association of which he was a Director and Vice-President. Mr. Rauchfuss was a strong friend of this Station. He gave Mr. Eckert much valuable assistance in his work in the San Luis Valley of Colorado last summer."

Jas. I. Hambleton reports that a sample of honey received at the Somerset, Md., laboratory "upon examination was found to contain a high percentage of melezitose, one of the rare sugars. The presence of melezitose in this sample was later verified by Doctor Hudson of the International Institute of Health, who is planning to obtain as much of the honey as possible in order to isolate a large amount of this sugar."

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